

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Canceled)
2. (Currently Amended) The computer-readable storage medium ~~system~~ of claim 26 ~~4~~, wherein each document type is a user-defined type (UDT).
3. (Currently Amended) The computer-readable storage medium ~~system~~ of claim 26 ~~4~~, wherein a document type can be a subtype of another document type.
4. (Canceled)
5. (Currently Amended) The computer-readable storage medium ~~system~~ of claim 26 ~~[[4]]~~, wherein the data store comprises a computed column for storing each type path.
6. (Currently Amended) The computer-readable storage medium ~~system~~ of claim 26 ~~[[4]]~~, wherein each type path comprises a variable-length encoded value.
7. (Currently Amended) The computer-readable storage medium ~~system~~ of claim 6, wherein each variable-length encoded value corresponds to a hierarchy level of the document type of the associated document.
8. (Canceled)
9. (Previously Presented) The computer system of claim 25, wherein each document type is a user-defined type (UDT).
10. (Previously Presented) The computer system of claim 25, wherein a document type can be a subtype of another type.

11. (Previously Presented) The computer system of claim 25, wherein each document has an associated type path.

12. (Previously Presented) The computer system of claim 11, wherein each type path belongs to a computed column in the table.

13. (Previously Presented) The computer system of claim 11, wherein each type path comprises a variable-length encoded value.

14. (Previously Presented) The computer system of claim 13, wherein each variable-length encoded value corresponds to a hierarchy level of the document type of the associated document.

15 – 24. (Canceled)

25. (Currently Amended) A computer system for processing a query, the computer system comprising:

a processor;

a memory;

a data store comprising a table of documents and associated pre-computed values, the pre-computed values comprising information to discern objects based on type pursuant to a hierarchical search, each document having an associated document type in a hierarchy of document types, the document type associated with a document being used to compute the pre-computed value associated with said each ~~that~~ document, wherein each pre-computed value is generated by concatenating respective type values of document types along a path from a root document type to the document type associated with the document with which said each pre-computed value is associated, and wherein each pre-computed value is compressed by separating the concatenated type values by a reserved separator byte; and

a document retrieval system that accesses the table in the data store to determine, for each document, if the ~~its associated~~ pre-computed value associated with said each document will satisfy the query, and generates query results comprising each pre-computed value that

satisfies the query, wherein the document retrieval system generates ~~is configured to generate~~ an estimate of the selectivity of the query at least in part by

creating a histogram over the pre-computed values, the histogram having a plurality of elements representing document types in a ~~the~~ hierarchy of document types, each element associated with a quantity of documents of the document type represented by said ~~each that~~ element,

encoding the query to describe one or more documents to retrieve based on an encoded query type,

for each element of the histogram, determining whether the encoded query type is a prefix of the document type represented by the element of the histogram,

for each element of the histogram for which the encoded query type is determined to be a prefix of the document type represented by the element of the histogram, adding the associated quantity to a sum of matching elements,

for each element of the histogram for which the encoded query type is determined not to be a prefix of the document type represented by the element of the histogram, adding the associated quantity to a sum of non-matching elements, and

generating the estimate of the selectivity of the query as a function of the sums of matching elements and non-matching elements.

Please add the following new claims.

26. (New) A computer-readable storage medium storing computer-executable instructions that, when executed, cause a computer system to process a query by:

accessing a data store comprising a table of documents and associated pre-computed values comprising information used to discern objects based on type pursuant to a hierarchical search, each document in the table of documents having an associated document type in a hierarchy of document types, the associated document type being used to compute the pre-computed value associated with said each document, wherein each pre-computed value is generated by concatenating respective type values of document types along a path from a root document type to the document type associated with the document with which

said each pre-computed value is associated, and wherein each pre-computed value is compressed by separating the concatenated type values by a reserved separator byte;

determining, for each document, if the pre-computed value associated with said each document will satisfy the query;

generating query results comprising each pre-computed value that satisfies the query;
and

generating an estimate of the selectivity of the query at least in part by
creating a histogram over the pre-computed values, the histogram having a plurality of elements representing document types in a hierarchy of document types, each element associated with a quantity of documents of the document type represented by said each element,

encoding the query to describe one or more documents to retrieve based on an encoded query type,

for each element of the histogram, determining whether the encoded query type is a prefix of the document type represented by the element of the histogram,

for each element of the histogram for which the encoded query type is determined to be a prefix of the document type represented by the element of the histogram, adding the associated quantity to a sum of matching elements,

for each element of the histogram for which the encoded query type is determined not to be a prefix of the document type represented by the element of the histogram, adding the associated quantity to a sum of non-matching elements, and

generating the estimate of the selectivity of the query as a function of the sums of matching elements and non-matching elements.

27. (New) A method for processing a query, the method comprising:

accessing a data store comprising a table of documents and associated pre-computed values comprising information used to discern objects based on type pursuant to a hierarchical search, each document in the table of documents having an associated document type in a hierarchy of document types, the associated document type being used to compute the pre-computed value associated with said each document, wherein each pre-computed value is generated by concatenating respective type values of document types along a path

from a root document type to the document type associated with the document with which said each pre-computed value is associated, and wherein each pre-computed value is compressed by separating the concatenated type values by a reserved separator byte;

determining, for each document, if the pre-computed value associated with said each document will satisfy the query;

generating query results comprising each pre-computed value that satisfies the query;
and

generating an estimate of the selectivity of the query at least in part by
creating a histogram over the pre-computed values, the histogram having a plurality of elements representing document types in a hierarchy of document types, each element associated with a quantity of documents of the document type represented by said each element,

encoding the query to describe one or more documents to retrieve based on an encoded query type,

for each element of the histogram, determining whether the encoded query type is a prefix of the document type represented by the element of the histogram,

for each element of the histogram for which the encoded query type is determined to be a prefix of the document type represented by the element of the histogram,
adding the associated quantity to a sum of matching elements,

for each element of the histogram for which the encoded query type is determined not to be a prefix of the document type represented by the element of the histogram, adding the associated quantity to a sum of non-matching elements, and

generating the estimate of the selectivity of the query as a function of the sums of matching elements and non-matching elements.